

credit of having first indicated, and to Prof. Boltzmann<sup>1</sup>—aided by many other eminent natural philosophers—that of having definitely established, this highly suggestive explanation or illustration. The doctrine of chances, to which artifice the statistical view of

(p. 139). "The conception of the 'sorting demon' is merely mechanical, and is of great value in purely physical science. It was not invented to help us to deal with questions regarding the influence of life and mind on the motions of matter, questions essentially beyond the range of mere dynamics" (p. 141). The other contribution through which Clerk-Maxwell's name has become celebrated in this connection is to be found in the so-called Maxwell-Boltzmann law of the distribution of kinetic energy in a mass of moving particles. The discussion of the subject dates from the first memoir of Clerk-Maxwell, quoted above; and, after Prof. Boltzmann had treated of the same subject in 1868, and Mr Watson in 1876, Clerk-Maxwell returned to it in a paper "On Energy in a System of Material Points" ('Camb. Phil. Soc.,' vol. xii.) In the year 1894 Prof. Bryan presented the 2nd part of his Report on "Our Knowledge of Thermodynamics" ('Brit. Assoc. Rep.,' 1894, p. 64, &c.), in which he gives an account of all the different investigations referring to this subject, up to that date. This was followed by a long discussion of the subject in the pages of 'Nature' (vol. li.), in which Messrs Bryan, Boltzmann, Burbury, Culverwell, Larmor, and H. W. Watson took part, and which gave Prof. Boltzmann the opportunity of giving a final expression of his opinion (p. 415).

<sup>1</sup> Prof. Boltzmann's investigations connected with the second

law of thermodynamics and the kinetic theory of gases cover the last thirty-five years. He has succeeded in putting the whole problem more and more into a strictly accurate, as also into a popularly intelligible, form. Unfortunately his very numerous contributions are scattered in various periodical publications, and have not yet appeared in a collected edition. Most of them appeared in the Proceedings and Transactions of the Vienna Academy, among which the Address delivered on the 29th May 1886 can be specially recommended. Since then, and after the correspondence in 'Nature' referred to in the last note, he has published his lectures 'Vorlesungen über Gas-Theorie' (2 vols., Leipzig, 1896-98). He there (vol. ii. p. 260, note) gives a list of the most important literature on the subject, and also a general summary regarding the application of the theory of probabilities to the distribution of the kinetic energy of a crowd of moving particles. In this connection he also deals with the consequences of the atomic hypothesis, the irreversibility of all natural processes, and the application of the second law to the history of the universe. He there says (p. 253): "The fact that the closed system of a finite number of molecules, if it had originally an orderly condition, and has then lapsed into a disorderly one, must finally, after the lapse of an inconceivably long period, assume again orderly conditions, is